POTATO GENE RESOURCES

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A Canadian view on the Seventh Session of the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture (GB-7)

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Introduction - Background on the Treaty

When great explorers such as N.I. Vavilov and his associates collected plant genetic resources for food and agriculture (PGRFA) around the globe and studied them intensively to further agriculture, they merely had to request visas to enter a country to conduct an expedition[1]. Phytosanitary aspects for moving living plant material only began to be considered at the beginning of the 20th century, while issues such as intellectual property rights, rights of ethnic groups, rights of indigenous people, rights of local communities, gender issues, Farmers' Rights and even Plant Breeders' Rights as such were nonexistent or, at least, unknown concepts. This changed drastically towards the end of the 20th century and we now see much more international discussion of all these rights and resulting obligations. Today it can no longer be denied that access to plant genetic resources and sharing the benefits of their use (ABS) are closely related; ABS regimes affect everybody working in plant breeding and associated research. Plant breeders' were the first to establish such rights to ensure their incomes.

The "International Treaty on Plant Genetic Resources for Food and Agriculture" (the Treaty) covers all plant genetic resources for food and agriculture and sets norms and standards for them. The Treaty's objectives are "the conservation and sustainable use of PGRFA and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity (CBD), for sustainable agriculture and food security"[2]. The Treaty was negotiated at the Food and Agriculture Organization of the United Nations (FAO) from 1993 to 2001, the year it was adopted. Canada signed and ratified the Treaty in 2002, and in 2004 it entered into force. The Treaty presently has 144 member countries (Parties) (Figure 1).

Figure 1. Membership status of countries in the Treaty[2].

The Treaty shares objectives with the CBD (which was adopted in 1992, entered into force in 1993, presently 196 Parties including Canada) and the "CBD's Nagoya Protocol on ABS" (adopted in 2010, entered into force in 2014, presently 104 parties; Canada is not a member). While the CBD and the Nagoya Protocol have a wide scope considering all genetic resources, the Treaty addresses plant genetic resources for food and agriculture. Therefore, the Treaty is most relevant for plant breeders, crop genebanks, researchers and all others working with genetic diversity of crop plants to ensure food security.

The Treaty is internationally binding law. The Parties implement the Treaty and the decisions that Parties to the Treaty take during sessions of its Governing Body (GB). These sessions are held every two years; the most recent session, which was the Seventh Session of the Governing Body (GB-7), was held in Kigali, Rwanda, from October 30 to November 3, 2017. Decisions taken by the GB take the form of Resolutions. Contracting Parties are expected to implement the Resolutions approved by the GB, but these are not legally binding. To support the Treaty's implementation, the Parties established a Secretariat, which is located in Rome at the Headquarters of the FAO.

In the two-year periods between GB Sessions, work is carried out by the Treaty Secretariat and by intergovernmental committees and working groups with defined mandates established by the GB. The Bureau of the Treaty, with one representative from each of seven FAO regions, advises the Treaty Secretariat and oversees its operation. The current representative for the North American Region on the Bureau is an official from the United States.

A core element of the Treaty is the "Multilateral System for Access and Benefit Sharing (MLS)", which covers a total of 64 crops listed in Annex I to the Treaty. The crops were selected based on great interdependency among countries and their importance for food security. All cereal crops and important vegetables such as cassava, sweet potato and potato are included in Annex I of the Treaty. Not included are soy and tomato, and many berry fruits of relevance for Canada. The MLS stipulates that access to genetic resources of these crops under the management and control of governments is provided by all Parties using a "Standard Material Transfer Agreement" (SMTA). Usually, recipients of genetic resources from the MLS in any country must sign the SMTA. The SMTA sets the terms and conditions under which payments must be made by users of genetic resources to the "Benefit Sharing Fund" (BSF). Presently, such payments are only obligatory if a product is released that incorporates genetic material accessed from the MLS and if this product cannot be used for further breeding without restrictions. The BSF is managed by the Treaty and supports projects that are in line with the objectives of the Treaty and conducted in developing countries. In addition to the 64 crops covered by Annex I of the Treaty, Canada decided to make all material held at PGRC at the Saskatoon Research and Development Centre, the Canadian Clonal Genebank (CCGB) at the Harrow Research and Development Centre, and the Canadian Potato Genetic Resources (CPGR) at the Fredericton Research and Development Centre, available under the conditions of the Treaty's SMTA. Other countries have also taken this approach.

More than 500 participants from Contracting Parties and other governments, international, non-governmental and farmers' organizations, international agricultural research centers, and industry associations attended the GB-7 session. The Plenary sessions and the work of three contact groups that met during breaks and evenings at GB-7, led to 14 resolutions. Agriculture and Agri-Food Canada (AAFC) is the lead Canadian government department for the Treaty, and three representatives for Canada attended GB-7. The agenda and all background documents, as well as the Resolutions and the official report of GB-7, are available on the Treaty Website. The website of the Earth Negotiations Bulletin also provides detailed accounts for each day

of GB-7 and a summary report. The following paragraphs present some of the main outcomes of GB-7.

Discussions on the Multilateral System for Access and Benefit Sharing (MLS)

A major concern is that the flow of funds from user based payments due to signing the SMTA to the Benefit Sharing Fund (BSF) that were anticipated by establishing the MLS and installing the SMTA has not yet happened. This has caused mistrust in several developing countries. Many discussions during GB-7 to improve the MLS of the Treaty resulted in better clarification of positions. However, they did not result in adoption of any changes to the SMTA, or in an expansion of the list of crops in Annex I of the Treaty, which identifies the material covered by the MLS. Switzerland suggested an expansion so that all crops be included in the MLS. Based on progress made during GB-7, discussions will continue into the future and hopefully compromises can be found. Conflicting views and mistrust between developed and developing countries make these discussions challenging. However, the declaration by representatives of the global seed industry, that it supports changes to the MLS that would enhance user-based payments and monetary donations to the BSF of the Treaty by countries and the plant breeding industry created some optimism. In the future, more countries may consider the expansion of Annex I of the Treaty to other crops. Such expansion is very much supported by Canada because it would enhance global food security and also the possibilities of sharing benefits. This view is also shared by some developing countries such as Brazil. Multilateral mechanisms on access and benefit sharing such as the MLS seem acceptable to many countries.

The Global Information System (GLIS)

The GLIS is a tool for more efficient exchange of information on plant genetic resources for food and agriculture that supports plant breeding, associated research, and conservation of genetic diversity for food and agriculture. The development of a GLIS for plant genetic resources for food and agriculture under Article 17 of the Treaty started in 2015 . Canada influences the development of the GLIS to ensure it becomes a useful tool for finding data on genetic resources in existing databases. Information sharing is seen by the Treaty as a non-monetary benefit. Information about diversity is always the starting point when conducting a research project or plant breeding. Genetic resources without associated information are of lesser value. The Government of Canada pursues an open data policy. All data of germplasm holdings and associated information preserved at the AAFC genebanks are made accessible via the GRIN-CA database. PGRC is actively pursuing an update to GRIN-Global, which will feed directly into the GLIS. The GLIS will make Canadian data visible to the global community of plant researchers, and supports the availability of readily accessible data held by other genebanks.

Genetic Information associated with plant genetic resources

Different views were expressed about whether genetic information associated with genetic resources, in particular genetic sequence data, should be treated as equal to genetic material, the plant genetic resource as such. The African region promoted such a view. Canada stated that there would be negative repercussions on the exchange of information if the two were deemed equivalent because Treaty conditions would also apply to information. Canada indicated amendments to the Treaty would be required in this case because the Treaty text clearly refers only to genetic material. This controversial topic has emerged in other venues such as the CBD and the FAO Commission on Genetic Resources. Countries were invited to submit views to the Treaty Secretariat. This will be discussed again at the next GB Session in November 2019 and is also considered by the Commission on Genetic Resources of the FAO. Similar discussions on this topic going

beyond the use for food and agriculture take place in the CBD context.

Farmers' Rights

The Treaty has an "Article on Farmers' Rights" and this topic was discussed at all previous sessions of the GB. GB-7 established a new *Ad-Hoc* Technical Expert Group on Farmers' Rights, reflecting a concern articulated in particular by Parties to the Treaty from the Group of Latin America and Caribbean Countries (GRULAC), Norway and Switzerland. This measure may enhance trust placed in the Treaty. The principal idea behind Farmers' Rights is to acknowledge the contributions farmers have made for centuries and still make today in cultivating, conserving and developing genetic diversity of crop plants. The new expert group will discuss how support for such activities can continue. However, the policies or laws in countries that are Parties to the Treaty are under the control of the respective countries.

Financial matters

The working group that takes care of funding matters now has the telling name "*Ad Hoc Committee on the Funding Strategy and Resource Mobilization*". All funds available for the BSF originated from donations by countries. Between 2015 and 2017, countries that donated funds were Australia, Austria, Italy, Norway and Sweden, and a small amount from Canada. First time donations from Industry were made by the International Seed Federation, the European Seed Association, and were also announced by the French Seed Sector. The BSF has made a fourth call for projects in November 2017 and has about USD 5.5 Million available to support projects in developing countries. For all other activities undertaken by the Treaty, a core budget of USD 7.8 Million was approved by GB-7 for the two year period 2017 to 2019. Most of the funds are requested to be contributed directly by the 144 Parties to the Treaty or indirectly by having FAO provide USD 2 Million from its regular program budget. The Canadian government will provide about USD 0.2 Million during the next two years. Most of the meetings of the intergovernmental working groups will require additional extra-budgetary sources of funding based on additional donations from countries.

Intersessional work over the next two years

Canada has the chance to engage in inter-sessional working groups in order to influence international developments that impact all users of plant genetic resources in Canada. There will be working groups on each of the following topics: (1) Sustainable Use; (2) Farmers' Rights; (3) The Global Information System; (4) Funding and Resource Mobilization; (5) the Multilateral System; and (6) Compliance with the Treaty. Most of these groups will have two meetings before the next session of the GB in November 2019. Consultation with Canadian stakeholders about these Treaty issues will be required to properly represent Canada's views in the working groups.

Canada's participation in GB-7 and conclusions

The USA and Canada represent the North American Region at GB-7. Canadian delegates made several interventions in the Plenary at GB-7 and influenced the discussions of the three contact groups on Farmer's Rights, Improvement of the Multilateral System and the Budget Committee. A final Plenary statement was made by Canada on behalf of the North American Region emphasizing the interdependencies among countries with respect to plant genetic resources for food and agriculture and the very positive effect this has on overcoming dividing viewpoints. The United States represents the region and moreover chair the Bureau of the Treaty during the two year period 2017-2019. The complexity of the issues that require 144 countries to agree upon in Treaty meetings often results in lengthy discussions. It is important to realize that not only the outcomes, but also the often convoluted process is part of coming to a common

understanding and to compromise on issues. Decisions taken by such a forum can have great weight. GB-7 changed the path of the Treaty by placing more emphasis on Farmers' Rights, by being more inclusive regarding the participation of the plant breeding industry, and by taking steps to support compromises regarding access and benefit sharing for plant genetic resources.

For more information, feel free to contact the author who is also the Canadian National Focal Point to the Treaty for Canada, at axel.diederichsen@agr.gc.ca or 1-306-385-9465.

Acknowledgement

The many comments provided on a draft of this article by Dr. Brad Fraleigh, AAFC, are greatly acknowledged.

References

[1]Vavilov, N.I. (1997) Five Continents. International Plant Genetic Resources Institute, Rome. Available on the Bioversity International website.

[2]FAO (2018) International Treaty on Plant Genetic Resources for Food and Agriculture.

Glycoalkaloids in Potatoes

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Glycoalkaloids are naturally occurring organic compounds found in various plant species of the Solanaceae family including popular vegetables such as potatoes, tomatoes, eggplants and peppers. Generally found in small amounts, higher concentrations of glycoalkaloids can be found in any green parts of the potato, near the tuber surface/peel as well as the sprouts, plant and leaves.

The majority of glycolkaloids produced in potato are α-chaconine and α-solanine. When analysed, they are expressed together as total glycoalkaloids (TGA). High concentrations of glycoalkaloids are toxic to humans with symptoms including: bitter or burning sensation in the mouth and flu-like symptoms such as nausea, vomiting and abdominal distress. Health Canada has established 20 mg TGA per 100 g of potato tuber fresh weight (20mg/100g FW) as the maximum acceptable level in all commercially sold potatoes in Canada[1]. A guide to minimize exposure to glycoalkaloids can be found on the Health Canada website.

TGA content between potato varieties can vary significantly. These can be attributed to genetic differences however TGA levels are also affected by growth, harvest and storage conditions[2]. For this reason, TGA analysis is an on-going evaluation of accessions in the Canadian Potato Genetic Resources (CPGR). While TGA levels in commercial potato varieties are below Health Canada standards of 20 mg/100g FW, varieties found in the Canadian Potato Genetic Resources contain TGA levels ranging from 1.5 mg/100g FW in "Newfoundland Elephant" to 67.4 mg/100g FW in "Blue Victor". Accessions with high TGA levels are annotated with *** on the accession list that accompanies the request form. Currently, 9 accessions: "All Red", "Blue Victor", "Conestoga", "Crotte D'Ours", "Haida", "Lenape", "LRC 373-5", "LRC 4373-5B" and "York" are noted as such. Approximately 15 CPGR accessions are sent to a Canadian Food Inspection Agency (CFIA) approved lab for TGA analysis annually. To date, 120 of accessions have been analyzed through liquid chromatography-mass spectrometry (LC/MS/MS) or prior to 2016 through high pressure liquid chromatography (HPLC). These values, and their representation as a percentage of the check "Shepody", are reported in Table 1.

References

[1]Health Canada website

[2]Knuthsen et al., 2009. Glycoalkaloids in potatoes: Content of glycoalkaloids in potatoes for consumption. Journal of Food Composition+ and Analysis 22: 577-581.

Table 1. Total glycoalkaloid (TGA) content in Canadian Potato Genetic Resources (CPGR) accessions.

CPGR Accession	mg TGA/100g FW (*)	% of Shepody	CPGR Accession	mg TGA/100g FW (*)	% of Shepody	CPGR Accession	mg TGA/100g FW (*)	% of Shepody
Abnaki	4.9(1)	N/A	Earlaine	3.3(1)	N/A	Nipigon	4.3(1)	N/A
AC Blue Pride	5.3(1)	147	Early Ohio	4.8(2)	82	Northern White	10.7(1)	N/A
AC Brador	9.7(1)	N/A	Early Rose	13.3(1)	633	NRBK 01	4.9(1)	82
AC Domino	4.5(1)	125	Elmer's Blue	13.2(1)	322	OAC Royal Gold	11.7(1)	160
AC Novachip	5.6(1)	156	Eramosa	8.5(2)	N/A	OAC Ruby Gold	2.6(2)	50
AC Red Island	5.1(1)	N/A	Fortyfold	9.7(1)	162	OAC Temagami	5.9(2)	101
Acadia Russet	6.8(1)	189	Fundy	2.9(2)	N/A	O'Higgin's Blue	8.2(1)	200
All Red	20.6(2)	N/A	Garnet Chili	3.8(1)	182	O'Higgin's Calico	5.5(1)	134
Angelina Mahoney's Blue	6.4(1)	107	German Butterball	1.7(1)	81	Peanut	3.4(1)	162
Arran Victory	7.4(2)	128	Glenwood Red	4.3(1)	105	Pink Pearl	8.2(2)	113
Anson	5.6(1)	156	Green Mountain	3.8(1)	N/A	Poorlander	4.5(2)	77
Austrian Crescent	5.8(1)	276	Gold Coin	2.5(1)	119	Purple Chief	12.0(2)	N/A
Avon	4.3(2)	126	Grand Falls	5.4(2)	N/A	Purple Viking	2.3(1)	110
Banana	11.3(2)	N/A	Haida	22.8(1)	N/A	Rambling Rose	8.9(1)	N/A
Bauer Grun Rote Auge	3.4(1)	46	Heidzel Blue	4.5(1)	214	Raritan	4.7(2)	N/A
Beauty of Hebron	16.1(1)	447	Hindenburg	14.2(2)	N/A	Ratte	5.2(2)	89
Belle-de-Fontenay	4.6(1)	219	Houma	9.3(1)	258	Red Acadian	3.9(1)	186
Belleisle	7.1(1)	197	Hunter	5.5(1)	N/A	Red Dutch	5.2(1)	248
Bliss Triumph	4.1(1)	114	Huron	6.0(1)	N/A	Richter's Jubel	3.1(2)	53
Blue Shetland	6.2(1)	103	Jemseg	7.7(1)	214	Rideau	7.8(3)	166
Blue Victor	67.4(2)	1153	Jogeva Yellow Estonian	7.7(1)	N/A	Rose Finn Apple	4.3(1)	205
Brigus	8.2(1)	228	K113-1	8.7(2)	189	Rose Gold	3.2(2)	70
Burbank	6.3(1)	154	Katahdin	4.3(1)	105	Ruby Pulsiver's Blue Noser	8.1(1)	135
Cain's Irish Rocks	7.2(2)	N/A	Kerr's Pink	3.5(1)	167	Russet Burbank	4.9(1)	136
Calico	5.8(1)	97	Keswick	3.8(1)	N/A	Sable	3.1(1)	148
Canso	6.6(2)	126	Kifli	9.1(1)	222	Sharon's Blue	7.6(1)	N/A
Canus	6.4(1)	107	Kroop Neber	2.8(1)	133	Shepody	4.9(9)	100
Caribe	3.9(1)	108	La Veine Rose	7.8(2)	N/A	Siberian	5.5(1)	N/A
Cariboo	5.0(1)	N/A	Lenape	45.0(1)	1250	Simcoe	9.7(1)	162
Cherokee	4.4(1)	N/A	Libertas	11.2(1)	311	Slovenian Crescent	11.0(1)	183
Chinook	4.8(2)	82	LRC 373-5	40.2(1)	1117	Stella's Newfoundland	1.8(1)	86
Christmas Island Rose	13.4(2)	235	LRC 4373-5b	30.9(1)	858	Straight Banana	9.3(1)	155
Columbia Russet	4.45(2)	N/A	Lumper	6.5(1)	N/A	The Cups	7.0(1)	N/A
Conestoga	29.5(2)	819	MacIntosh Black	4.9(1)	82	Up-to-Date	12.0(1)	333
Congo	7.9(5)	157	Makah/Ozette	10.2(2)	385	Urgenta	8.3(1)	231
Corne de Mouton	5.0(1)	83	Manota	7.7(1)	128	USDA X 96-56	10.7(1)	147
Cow Horn (Beige)	4.8(2)	82	Marc Warshaw's Quebec	5.8(2)	N/A	White Rose	3.3(1)	80
Crotte D'Ours	19.6(2)	N/A	McIntyre blue	9.3(1)	443	Yam	6.8(1)	113
Cupids	9.6(1)	267	Mouraska	8.2(2)	171	York	22.8(2)	N/A
Dorita	9.6(1)	267	NFLD Elephant	1.5(1)	71	Yukon Gold	6.9(4)	N/A

* = Number of years tested. N/A = Check other than Shepody used.

Celebrating Canada 150 with Potatoes

Canadian Potato Genetic Resources on Display

Teresa Molen
Fredericton, NB

July 1st, 2017 marked the 150th anniversary of the Canadian Confederation. To commemorate this event, celebrations were held across the country.

Research Scientist/Germplasm Curator, Dr. Benoit Bizimungu (Right) and Gene Bank Technician, Teresa Molen present posters on display at the Canada 150 Open House in Fredericton, NB.

The Fredericton Research and Development Centre celebrated with an Open House on Saturday August 19th. Despite the rainy weather, the event was a great success. Approximately 70 staff greeted upwards of 400 guests and several media outlets including Global TV, CBC TV and The Daily Gleaner. Their coverage can be viewed through the following links: **Global News NB** - From farm to table: Spud scientists reveal process behind potatoes; and **CBC NB** - Potato research lab shares milestones at open house.

Along with many other labs showcasing their research, the Canadian Potato Genetic Resources provided an extensive display including posters, heritage and Canadian Bred tubers, "in vitro" plantlets, mini and micro tubers. Plants growing in tubes and tiny micro-tubers are always a hit with young and old alike.

Fredericton brothers Derek Miller, 9, and 7 year-old Colin take a close look at one of the potatoes on display.

Canada 150 Heritage Garden

Janet Wallace
Albert County, NB

New Brunswick culture is a tapestry of influences from the First Nations; settlers from what are now France, Germany, Ireland, Scotland, England and the U.S.; and more recent immigrants from all around the globe. Our rich cultural heritage is reflected in the diversity of foods we eat and the plants we grow. For the last few years, I have been planting heirloom varieties of vegetables, including potatoes, at community gardens in rural Albert County, NB. In Potato Gene Resources Newsletter 23, these activities were introduced in an article titled "Atlantic Seed Stories". To celebrate Canada's heritage and 150th anniversary in 2017, I planted a Canada 150 heritage garden at the Albert County Museum in Hopewell Cape as well as an elementary school garden in Riverside-Albert, NB. This project was funded in part by the Government of Canada.

Albert County Museum in Hopewell Cape, NB

At the museum, visitors were offered a guided tour through the heritage garden. If it was raining or they were pressed for time, visitors were given a guide to enable them to have self-directed tours. Information on the potato part of the self-guided tour is below.

Potatoes were a major part of the garden tours and discussions. For example, while leading tours of the heritage garden at the Albert County Museum and interviewing residents of Forest Dale Home, many people told me about this tradition of eating blue potatoes with fish. I heard it from Nova Scotians and New Brunswickers, both Anglophones and Acadians. Also, many Acadians talked about eating potatoes in one way or another for 2-3 meals a day, and some meals encompassing potatoes in multiple ways (e.g., fricot which contained potatoes would have potato dumplings and be served with potato pancakes).

Local people who had worked at the Potato Research Sub-Station in Alma (1940s – 1975) also dropped by. Some of the varieties grown at the station during that time made their way into the gardens of local people. For many years afterwards, people were growing "Early Rose" and "Fundy" potatoes in the area. "Fundy", was developed at Agriculture Canada in Fredericton through breeding trials near Alma in what is now Fundy National Park in Albert County, NB.

Many of the varieties grown in the museum garden were provided by the Canadian Potato Genetic Resources in Fredericton. At the Harvest Feast in September, we served potatoes in various ways including colourful bowls of steamed potatoes featuring: blue-fleshed "Nova Scotia Blue" and "River John Blue"; yellow-fleshed "Corne de Mouton" and "Yellow Fin"; red-skinned "Early Rose" and "Acadian Red"; white-skinned "Fundy" and "Shepody"; and lumpy, knobby "Lumper". We also saved some potatoes to plant in following years and donated others to the Shepody Food Bank.

As part of the Canada 150 project, I collected more than 200 recipes, as well as stories, from residents of Kent and Albert Counties, NB. The recipes range from the traditional to the exotic reflecting the many cultural influences in the area. For example, the cookbook includes many traditional Acadian, German and British dishes, as well as recipes from Korea, the Middle East, Eastern Europe, Italy, China and other countries where New Brunswickers immigrated from, lived in or visited. "Fiddleheads, Fricot & Frittata: A Hodgepodge of Atlantic Canadian Recipes" is available on the Albert County web site for only $8 including tax. The cookbook will be available starting June 1st. It can be picked up from the museum or shipped (at an additional cost).

Annual Report 2017

Canadian Potato Genetic Resources

Teresa Molen

The Collection

1. Holdings

• The Canadian Potato Genetic Resources is a node of Plant Gene Resources Canada and holds 177 clones within its genebank. Of this total, 176 are maintained *in vitro*, and 115 clones were grown for tuber production at our Benton Ridge Potato Breeding Substation,

Benton, New Brunswick. A full listing of accessions may be found in the request form. The following chart illustrates the types of clones in each category.

2. New Accessions

• One clone was accepted into the Repository in 2017. "Black Bull", donated by Eric McCumber of Long Reach, NB, is currently undergoing virus freeing and tissue culture establishment. We hope to have it available next year when we will also introduce it.

3. Evaluations

• Twenty-two accessions were grown in an evaluation trial at the Fredericton Research and Development Centre. Two replications of fifteen hills of the following varieties: "OAC Royal Gold", "NRBK 01", "NRBK 02", "NRBK 03", "NRBK 04", "NRBK 05", "NRBK 06", "NRBK 07", "NRBK 08", "NRBK 09", "NRBK 10", "NRBK 11", "Congo", "Shepody", "Chieftain", "O'Higgin's Calico", "O'Higgin's Blue", "Superior", "Christmas Island Rose", "Glenwood Red" and "Burbank". Samples were also taken for Total Glycoalkaloid (TGA) Analysis, specific gravity measurement, photographs and culinary evaluation.

• Thirty-one clones were grown in 20-hill plots at the Benton Ridge Potato Breeding Substation, Benton, NB, to provide material for demonstration and cooking quality evaluation throughout the winter and spring.

4. Management

• Passport data for 167 PGR accessions is available online at the Genetic Resources Information Network-Canadian Version (GRIN-CA). GRIN-CA may be accessed through the Plant Gene Resources of Canada website. No new information was posted in 2017 due to the inaccessibility of GRIN-CA during upgrades.

• Disease testing was conducted for new *in vitro* accessions and clones which have been maintained *in vitro* for five years. Forty-two clones were grown in the greenhouse and tested twice in 2017. All clones were negative for PVA, PLRV, PotLV, PVS, PVX and PVY. Results for PSTV and BRR are pending. Extra minitubers from the greenhouse grow out will be offered to genebank clients in the spring of 2018.

• All *in vitro* clones were screened twice during 2017 for bacterial and fungal contamination using Potato Dextrose Broth and Richardson's Broth. All clones currently in the Genebank are negative for these contaminants.

• A total of 1267 microtubers were harvested from 176 of the genebank accessions in 2017. Approximately half of the microtubers were sent to Saskatoon in November 2017 to be stored as back up at PGRC. The viability of the collection is protected by this remote location storage arrangement. Dallas Kessler, of Plant Gene Resources Canada, Saskatoon SK, continues to monitor the microtubers. The remaining microtubers are stored at the genebank in Fredericton, NB.

5. Distribution

• Accessions in the Canadian Potato Genetic Resources fall under The International Treaty on Plant Genetic Resources for Food and Agriculture which requires the recipient to sign a Standard Material Transfer Agreement (SMTA) that the material shall be used or conserved only for the purposes of research, breeding and training (education) for food and agriculture. This agreement is included with the request form. For more information and

assistance in determining whether your plans fall into this agreement visit: The International Treaty on Plant Genetic Resources website. By accepting shipment of the requested material you are accepting the terms of the SMTA and recognize that your name will be submitted as a recipient of this material to the Governing Body of the Treaty.

• Eighteen requests for 512 clones were received in 2017. Of this number, 98 clones were distributed as *in vitro* plantlets, 244 clones as field grown tubers, and 170 clones as greenhouse grown minitubers. "Prince Albert", "Early Rose", "Likely" and "Marc Warshaw's Quebec" were the most requested accessions in 2017.

Distribution of Clones by Purpose – 2017

Purpose of Request	Number of requests	Clones	*In vitro* plantlets	Field tubers	Mini-tubers
Research	15	384	82	207	95
Teaching or Demonstration	3	128	16	37	75
Conservation	0	0	0	0	0
Total	18	512	98	244	170

Requests by Destination – 2017

Destination	Number of requests
Newfoundland and Labrador	1
Prince Edward Island	1
New Brunswick	6
Quebec	2
Ontario	4
Saskatchewan	1
Alberta	1
USA	2
Total	18

Five-Year Compilation of Clone Distribution for Potato Gene Resources 2013-2017

Year	Research	Education	Conservation	Total	Field tubers or mini-tubers	*In vitro* plantlets	Total
2013	15	2	3	20	422	85	507
2014	13	2	11	26	492	119	611
2015	14	1	7	22	360	186	546
2016	23	4	5	32	826	195	1021
2017	15	3	0	18	414	98	512
Total	80	12	26	118	2514	683	3197

Repository Items of Interest

Communication

• On April 13, 2017, The Walrus published an article written by Karen Pinchin titled: "Inside Canada's Secret Potato Laboratory". The article can be found at The Walrus website.

• A gene bank article written by Julie Root, Communications Officer for AAFC Atlantic Region, was published on Monday June 5, 2017 during World Environment Day. The article titled Keeping potatoes alive: We've got your "backup" was accompanied by an infographic and tweet graphics. Other interesting posts can be found on the Agriculture and Agri-Food Canada Facebook page.

• On June 12, 2017, Radio-Canada's L'Heure de pointe – Acadie program aired a segment on the gene bank by Sophie Desautels titled La patate sous haute surveillance.

• An article titled "Putting the 'wild' into potato research" was printed in the Daily Gleaner on June 8, 2017.

• On June 17, 2017, Acadie Nouvelle printed an article by Sébastien Lachance titled: "Le 'coffre-fort' des patates est situé à Fredericton".

• In addition to the requests for clones, many requests for information about the genebank, the availability of clones, clone descriptions and pedigrees, and techniques for handling *in vitro* material were received throughout 2017.

• The annual Potato Gene Resources newsletter has a distribution list of approximately 300 recipients.

• The current newsletter and several back issues may be accessed on the Weekly Checklist of Government of Canada Publications.

Meetings and Miscellaneous Information

• The second edition of Agri-Science Days on Biodiversity, Bioresources, and Collections was held at the Ottawa Research and Development Centre and attended via videoconference on Jan 4-5, 2017.

• The 2017 annual Technical Advisory Committee (TAC) meeting of the USDA potato genebank NRSP6 project was held at Pyle Center, Madison, WI, and attended by Dr. Benoit Bizimungu via videoconference on June 13, 2017. Information on the genebank and minutes of TAC meetings can be found at the USDA Potato Genebank website.

Donor Agreement

• Donors wishing to provide plant material to Agriculture and Agri-Food Canada for the purpose of research, conservation and distribution by Plant Gene Resources of Canada must now complete a "donor agreement". Decisions on accepting material into the Canadian Potato genebank are up to the discretion of the curator, Dr. Benoit Bizimungu (Benoit.Bizimungu@agr.gc.ca).

Displays

• A large display featuring posters and accessions were exhibited at the Canada 150 Celebration Open House at the Fredericton Research and Development Centre on Saturday, August 19, 2017. An article titled "Canadian Potato Genetic Resources on Display" is presented in this Newsletter.

Visitors

• June 7, 2017 – Sophie Desautels from Radio-Canada, visited the genebank and interviewed Dr. Benoit Bizimungu. The resulting program, La patate sous haute surveillance, aired on Radio-Canada's L'Heure de pointe – Acadie program.

Fredericton Research and Development Centre Website

• The Fredericton Research and Development Centre is custodian of the Canadian Potato Genetic Resources. The Fredericton Research and Development Centre website offers an overview of the Centre's mandate, resources and achievements along with research studies being conducted at the Centre and the staff associated with those studies.

Plant Gene Resources of Canada

• PGRC, the national Canadian genebank, preserves, characterizes and distributes plant genetic resources for food and agriculture. PGRC is based on collaboration between AAFC Research Centres and people dedicated to preserving the genetic diversity of crop plants and their wild relatives. PGRC plays a significant part of AAFC's commitment to the Canadian Biodiversity Strategy in response to the Convention on Biological Diversity and the International Treaty on Plant Genetic Resources.

• The Plant Gene Resources of Canada (PGRC) website includes information on the PGRC multi-nodal system of germplasm conservation in Canada and allows searching for germplasm information on the Genetic Resources Information Network-Canadian version (GRIN-CA). Dr. Axel Diederichsen, Research Scientist and Curator at PGRC can be contacted at the Saskatoon Research and Development Centre of AAFC at axel.diederichsen@agr.gc.ca.

The Genebank and the Seed Potato System

• The Canadian Potato Genetic Resources provides *in vitro* plantlets and greenhouse or field tubers for breeding, research and heritage preservation. While extensively tested for freedom from disease, the plantlets and tubers distributed are produced outside the Canadian Seed Certification System and are not eligible for certification.

• The Canadian Seed Potato Certification System operates under the *Seeds Act* and its regulations. Certification begins with tested plantlets established *in vitro* in a facility accredited for this task by the Canadian Food Inspection Agency (CFIA). The plantlets are used to produce greenhouse tubers which then go to the field in a limited generation system, at each step meeting strict standards specified in the regulations. More information on potato seed certification can be found at the CFIA website.

Help us Reduce our Paper Usage

The Potato Gene Resources Newsletter is available as an electronic version. If you are still receiving a paper version and wish to receive future Newsletters by e-mail, in pdf (portable document format), please send your e-mail address to: Teresa.Molen@agr.gc.ca. We will continue to send the printed Newsletter to those who do not ask to receive it electronically. Maintaining contact with you is important.

Curator's Note

After many years of service with the Government of Canada, including 7 years with the Canadian Potato Gene Resources, Ms Teresa Molen has decided to retire effective July 26, 2018. I take this opportunity to express my sincere appreciation to Teresa for her dedication and contribution to the mission of the Canadian Plant Gene Resources Potato Node. I am sure those who had some interaction with Teresa through various requests of information or genebank accessions will recognize her excellent service.

We wish her health and happiness in her retirement and in all future endeavours.

Benoît Bizimungu, PhD
Potato Breeder & Gene Resources Curator

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Potato Gene Resources

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